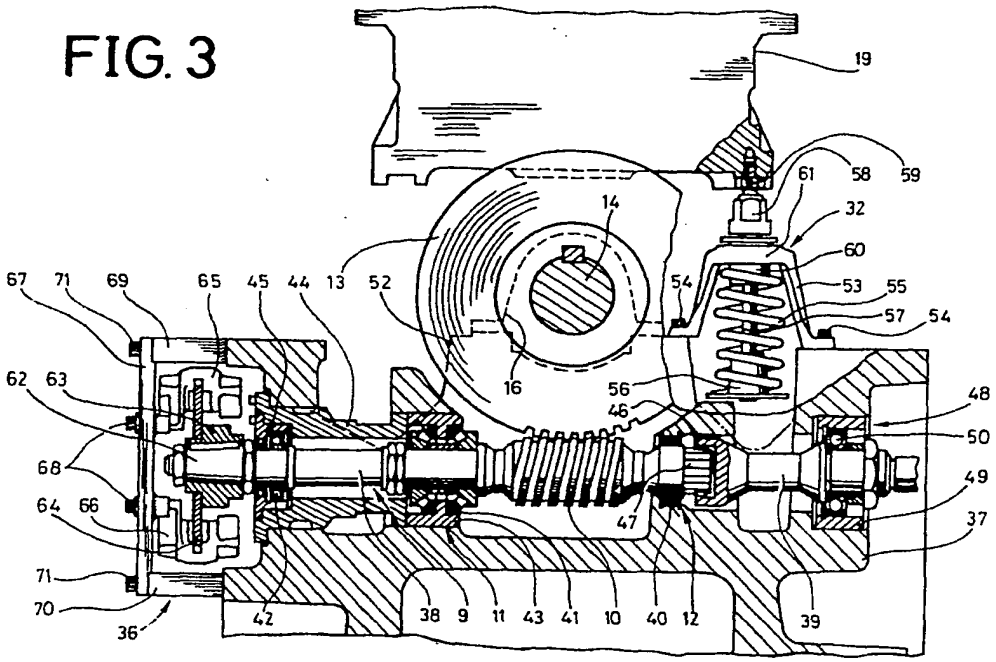
(12) UK Patent Application (19) GB (11) 2 118 090 A

(21) Application No 8308997
(22) Date of filing 31 Mar 1983
(30) Priority data
(31) 2276/82
(32) 15 Apr 1982
(33) Switzerland (CH)
(43) Application published
26 Oct 1983
(51) INT CL³
B26D 1/40 B30B 1/14
15/28
(52) Domestic classification
B4B 1G6 1P2
B5F 1A1 2B 2X
(56) Documents cited
None
(58) Field of search
B4B
B5F
B3W
(71) Applicant
Bobst SA,
(Switzerland),
CH-1001 Lausanne,
Switzerland
(72) Inventor
Gregor Schoch
(74) Agent and/or address for service
F. J. Cleveland and Company,
40—43 Chancery Lane,
London,
WC2A 1JQ

(54) Driving device for a cutting station of a platen press

(57) A driving device for the cutting station of a platen press comprises four toggle-joints 28, 29 30 and 31 provided with cam rollers 24, 25, 26 and 27 each resting on its cam 20, 21, 22 and 23. The four toggle-joints 28, 29, 30 and 31 are arranged in pairs perpendicularly to the transport direction of the sheets in the press, the pairs of toggle-joints 28, 31 and 29, 30 being located on the same axis, as in the transport direction of the sheets in the machine, one pair of toggle-joints 29, 30 being located between the other pair of toggle-joints 28, 31. The toggle-joints 29, 30 are mounted on a release device 149 driven by a security coupling. The cams 20, 21, 22 and 23 are mounted on a common shaft 14 provided at its end with a braking mechanism 36. The declutching of the security coupling simultaneously controls the operation of each release device 149 and of the braking mechanism 36.

FIG. 3



GB 2 118 090 A

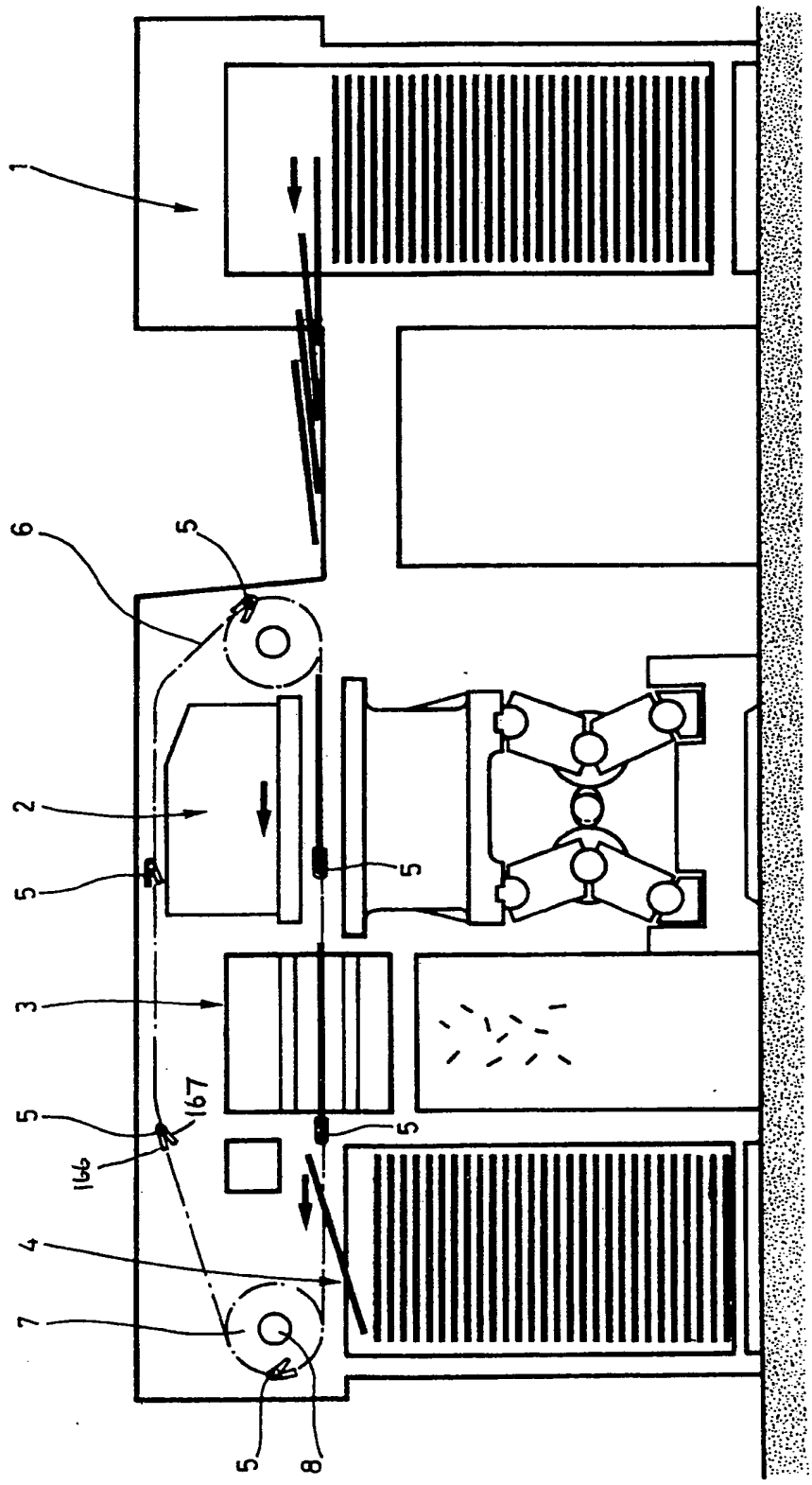


FIG.1

2118090

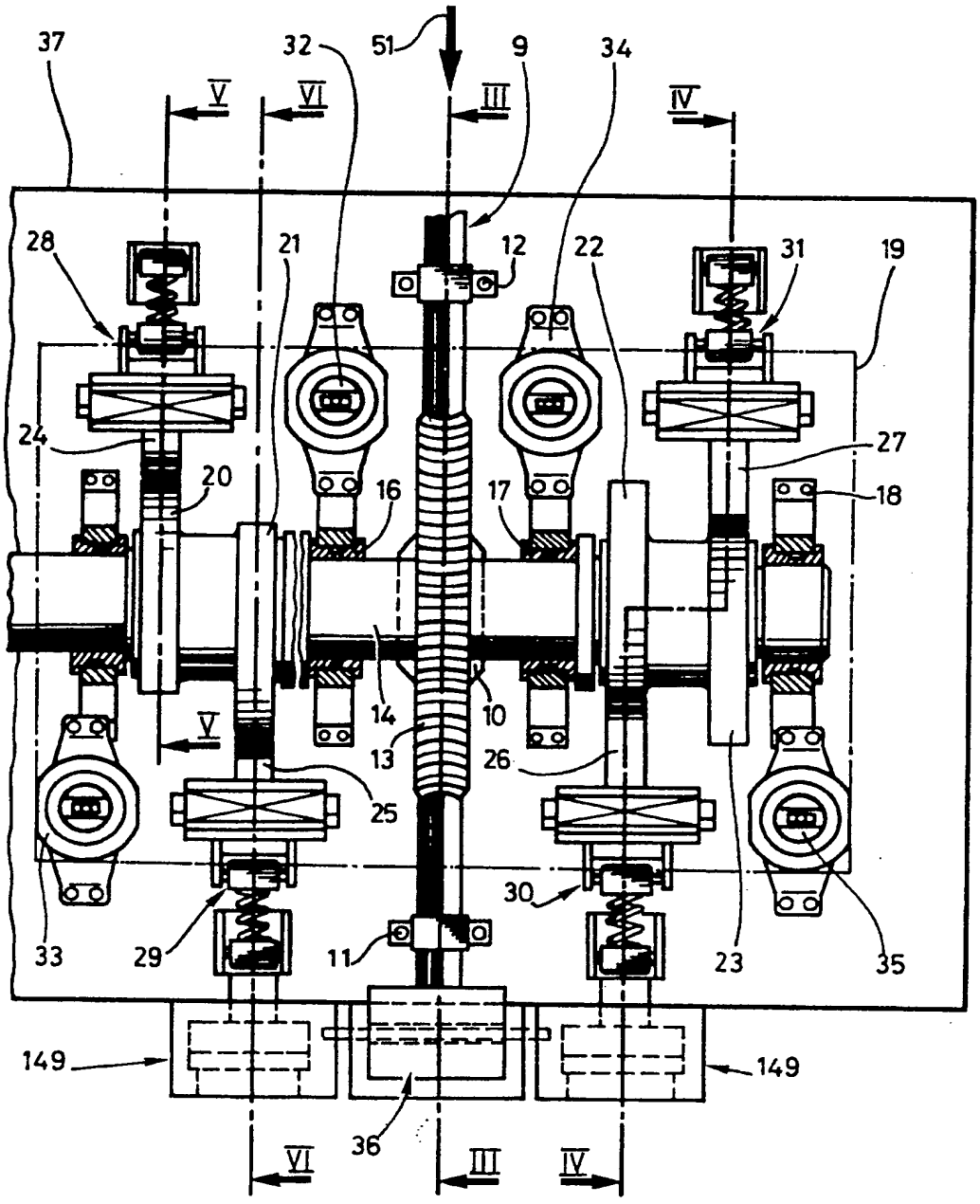


FIG. 2

2118090

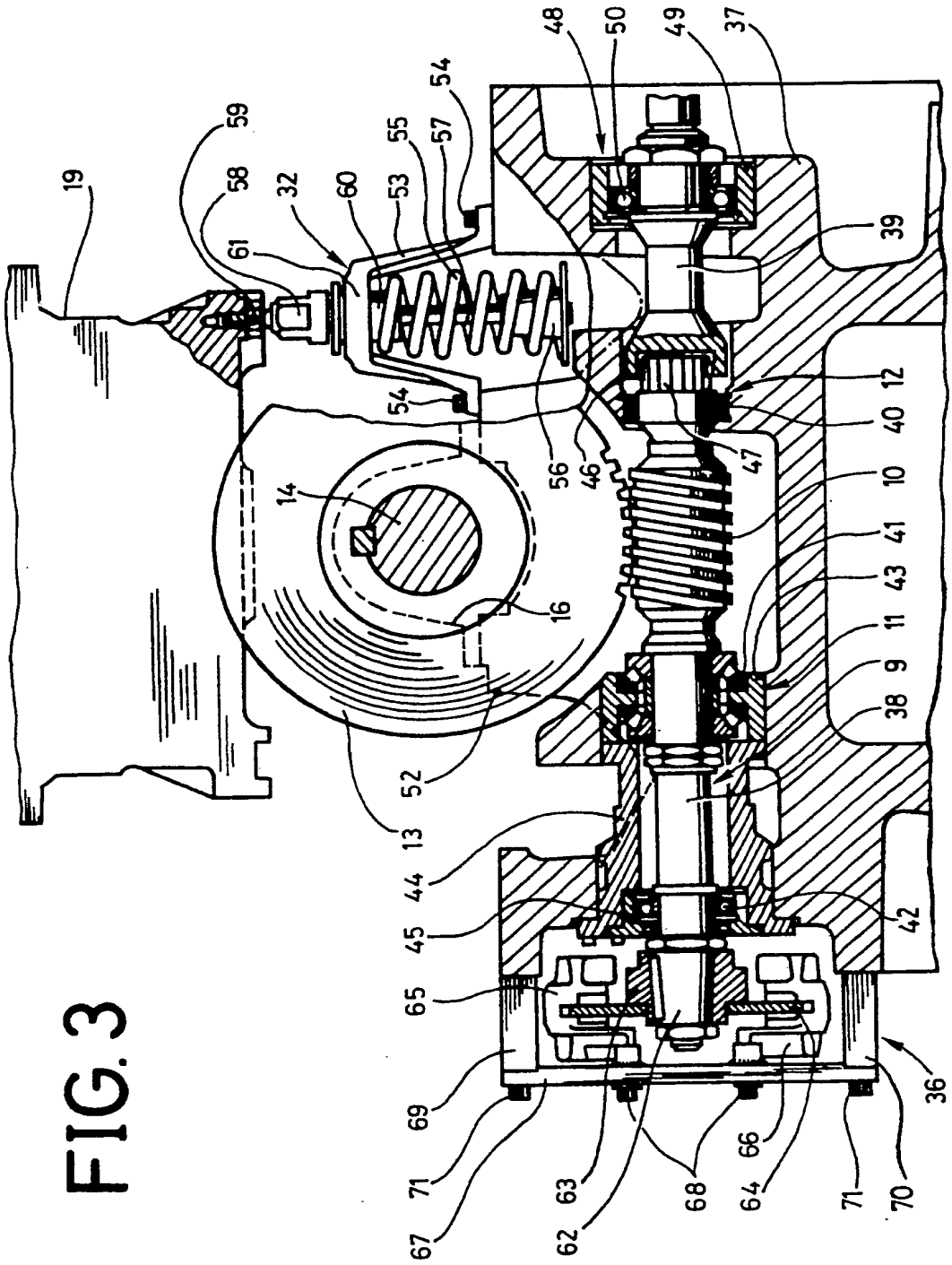
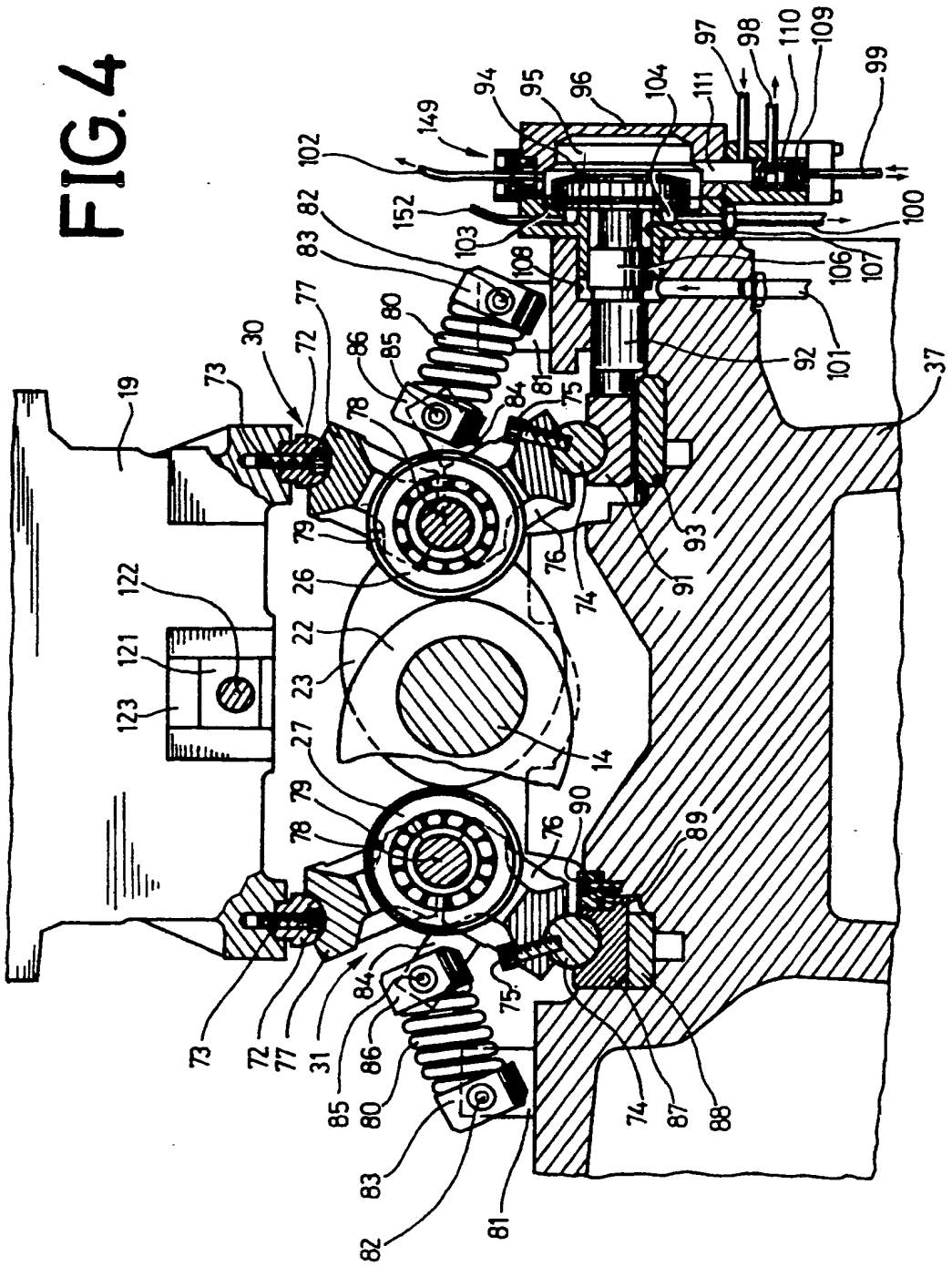


FIG.3

2118090

FIG.4



2118090

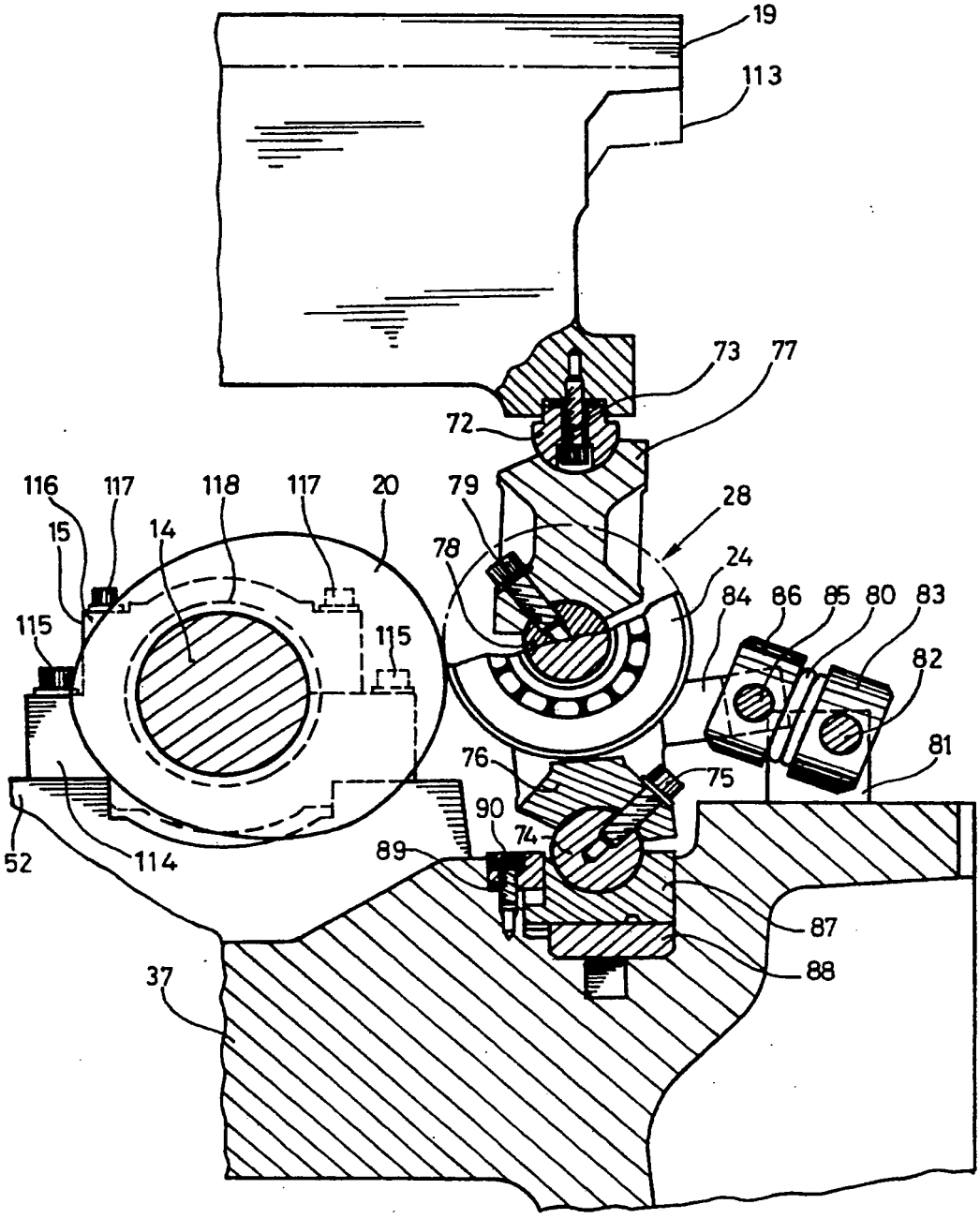


FIG. 5

2118090

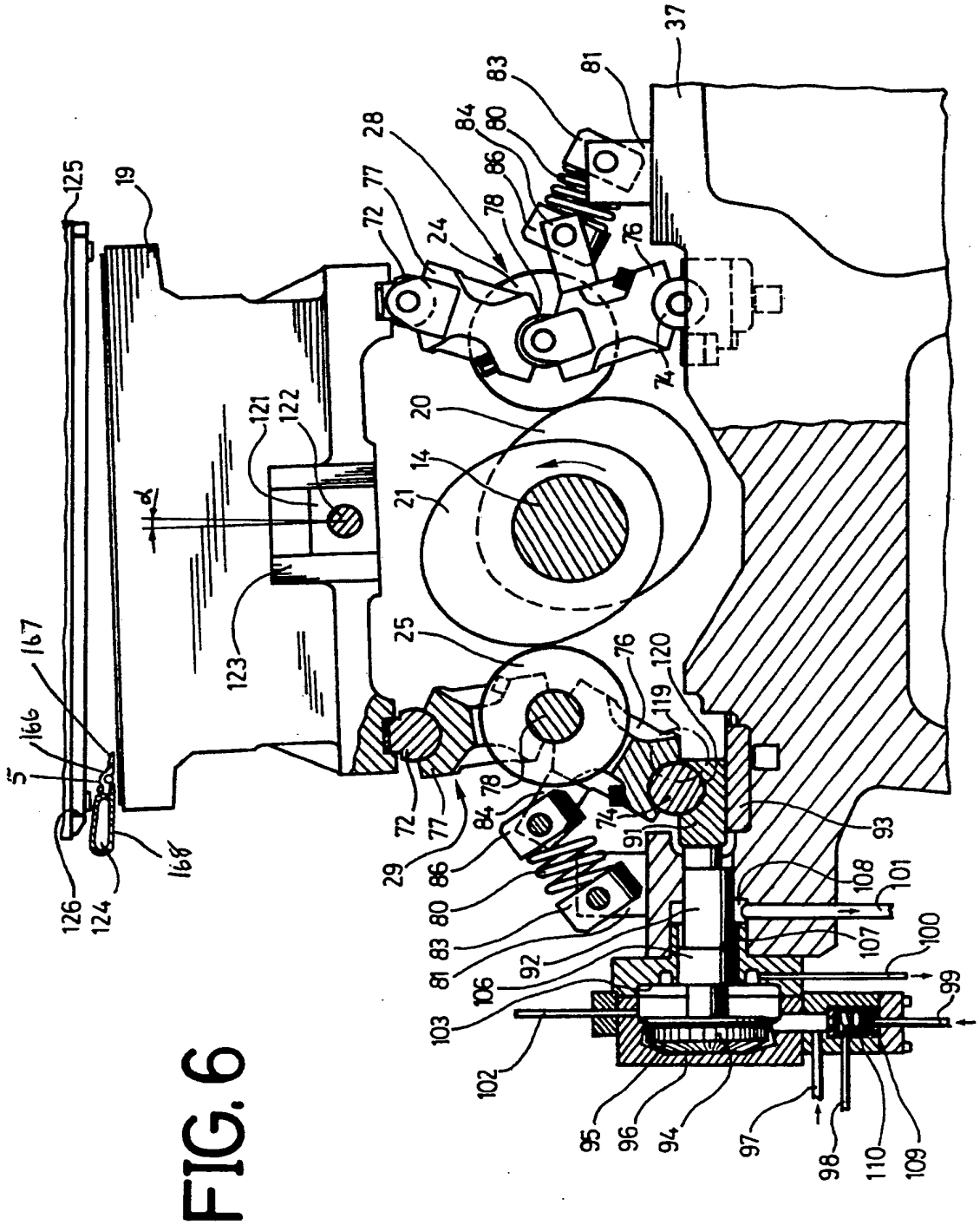
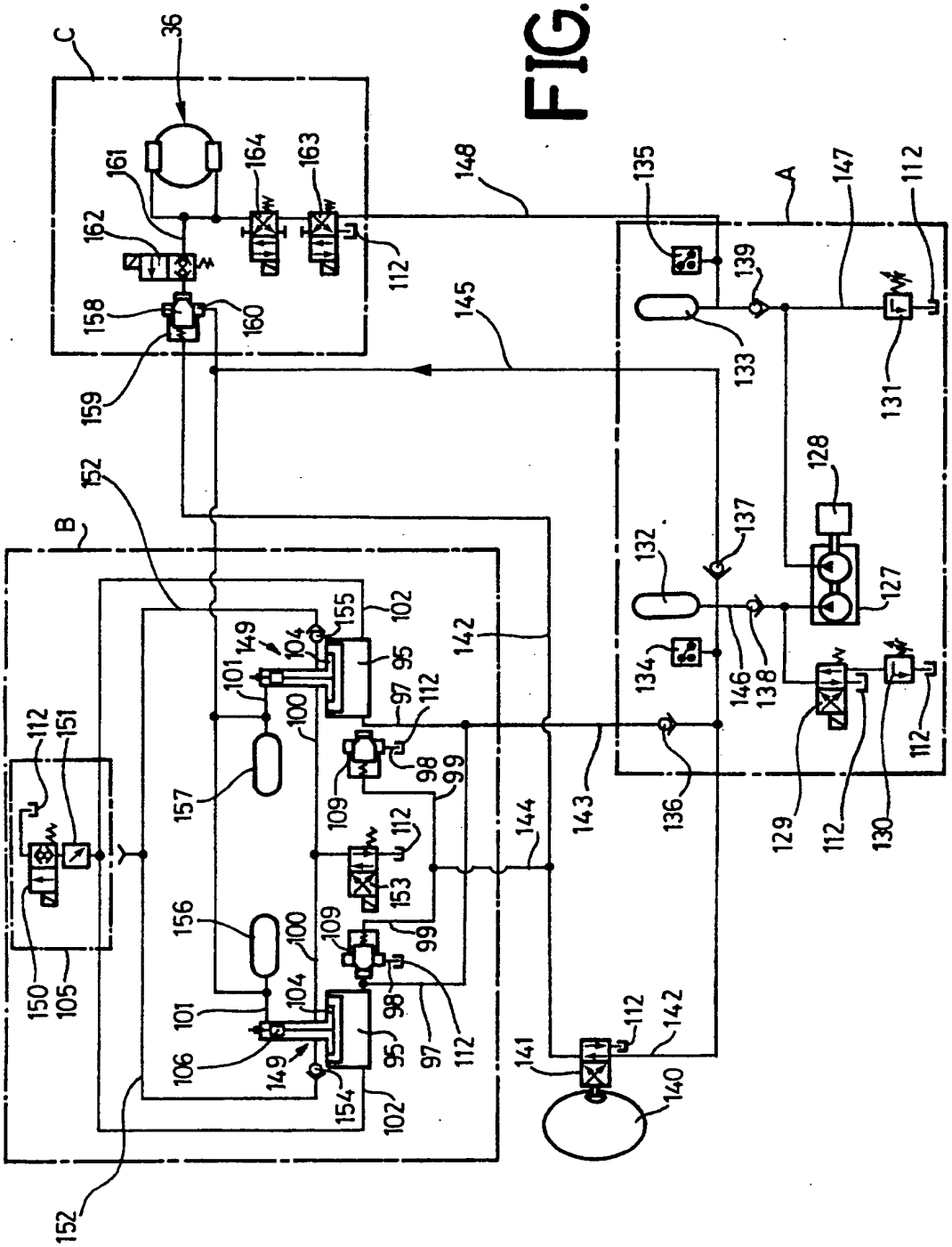


FIG. 6

2118090

FIG.7



SPECIFICATION

Driving device for a cutting station of a plat n press

The present invention relates to a platen press of the type which comprises a lower movable platen, an upper fixed platen, means for actuating the lower movable platen and means for transporting sheets through the cutting station of the press.

Driving devices for the cutting station of platen presses which operate by means of a driving cam and a group of toggle-joints actuating the lower movable platen with an up and down movement are known. Examples are described in U.S. Patent Specification Nos. 1 053 566, 2 043 246 and 2 425 040. U.S. Patent Specification No. 1 053 566 shows the use of a cam located on a shaft outside of the toggle-joint system. In this arrangement, the movement generated by the cam is transferred to the toggle-joint system by means of a lever with cam-rollers. U. S. Patent Specification No. 2 043 246 describes a driving device for a press using a cam on the axis of symmetry of a toggle-joint system. The cam is mounted on a shaft located below the lower pivoting points of the toggle-joints. A set of levers are connected on one end to each pair of toggle-joints and on the other end to a cam-roller. A guiding device mounted on the axle of the cam-roller ensures the centering and determines the lateral position of the axle of the cam-roller, so that the force is equally distributed to the toggle-joints.

U. S. Patent Specification No. 2 425 040 also describes a driving device acting on the lower platen of the press. It shows that the use of a cam with inner grooves for controlling the motion of the lower plate is known. In this execution, the movement generated by the cam is transferred to a stirrup linked by a lever to each toggle-joint. The guiding of the lower platen occurs with the help of a central slide. As far as the control of the movement of the lower platen is concerned, the above-mentioned devices all show interesting characteristics, for instance the possibility to influencing the stroke, the speed and the acceleration of the movement of the lower platen. But all these devices use one or several levers mounted between the toggle-joints and the cams, and this complicates the geometry of the driving device and increases the danger of an inaccurate movement, because there are more leading points. Moreover, these constructions involve an important load on the contact surfaces between the cams and their rollers, for the toggle-joints are usually actuated in pairs by means of one single cam. Furthermore, none of the prior art devices is provided with a security device acting directly on the toggl -joints.

An object of the present inventi n is to overcome the difficulties created by the cutting station driving devices which comprises cams and toggle-joints.

According to the present invention there is provided a cutting station of a platen press comprising a lower movable platen, an upper fixed platen, the lower plat n being mounted on an arrangement of cam operable toggle links, driving means for rotating the cams to cause the toggle links to move successively between an extended and a retracted position thereby producing a reciprocating raising and lowering of the lower platen, release means associated with at least some of the toggle links for releasing operation thereof, and braking means associated with said driving means, said release means and said braking means being operable substantially simultaneously in response to the detection of an overload condition in the platen press.

The invention will be described now by way of example only with particular reference to the accompanying drawings. In the drawings:

Figure 1 is a general schematic view of a platen press;

Figure 2 is a plan of the cutting station of a platen press;

Figure 3 is a cross sectional view along the line III—III of Figure 2;

Figure 4 is a cross sectional view along the line IV—IV of Figure 2;

Figure 5 is a cross sectional view along the line V—V of Figure 2;

Figure 6 is a cross sectional view along the line VI—VI of Figure 2, and

Figure 7 is a schematic diagram showing the hydraulic control circuitry for the security device.

Figure 1 is a general schematic view of a platen press having a feeding station 1, a cutting station 2, a stripping station 3 and an ejection station 4 for piling up the cut sheets. The sheets to be processed in the platen press are taken up at the feeding station, transported by grippers through the cutting station 2 and gripping station 3, until they reach the ejection station 4, where the grippers release the sheets which are then piled up. The grippers 5 are mounted on bars extending generally perpendicular to the direction of movement of the sheets in the platen press. Each bar provided with grippers is linked at each end to a worm chain 6 which is driven by a chain wheel 7 mounted on a shaft 8. This shaft controlling the chain wheel 7 is provided with a security coupling (not shown in Figure 1). The security coupling is equipped with a device which allows a control by a piloting circuit to provide an emergency stop and is described in detail with reference to Figure 7. The control provided by the piloting circuit operates as soon as an overload occurs in the driving of the endless chains 6.

Fig. 2 is a plan view of the cutting station 2 of the platen press. To make the drawing as clear as possible, the upper platen and the silhouette of the lower platen, i.e. the movable bearing, is shown by dotted lines. The cutting stati n 2 comprises a driving-shaft 9 with a worm 10. The driving shaft 9 is supported by bearings 11 and 12. The worm 10 engages a worm g ar 13 on a wheel which is mounted on a shaft 14 supported by bearings 15, 16, 17 and 18. The shaft 14 is

provided with cams 20, 21, 22 and 23 which cooperate with cams 24, 25, 26 and 27 which are mounted on toggle-joints 28, 29, 30 and 31. The lower movable platen is shown at 19 and is urged downwardly by pulling means 32, 33, 34 and 35. The toggle-joints 28, 29, 30 and 31 are arranged in pairs perpendicular to the direction of movement of the sheets in the machine. The toggle-joints 28 and 31 are located on the same axis as are the toggle-joints 29 and 30. When viewed in the direction of movement of the sheets in the machine, the toggle-joints 29 and 30 are positioned between the toggle-joints 28 and 31. The pulling means 32 and 34 are located between the toggle-joints 28 and 31, and the pulling means 33 and 35 are located on each side of the toggle-joints 29 and 30. The driving shaft 9 is provided with a braking system 36 which is mounted on one end thereof and its other end is coupled to a driving device (not shown).

Referring to Figure 3 the cutting station 2 comprises a frame with a lower crosspiece 37, on which the driving means of the movable bearing 19 are mounted. One of these means, i.e. the worm 10, is associated with the driving shaft 9 which is formed from two semi-cylindrical shafts 38 and 39. The semi-cylindrical shaft 38, in which the worm 10 is cut is supported at one end by the bearing 12 which comprises a cylindrical roller-bearing 40. The other end rests on the bearing 11 which comprises a pair of cam-shaped roller-bearings 41 and a ball-bearing 42. The pair of cone-shaped bearings 41 is mounted in a sleeve 43. This sleeve is arranged so that it can be removed on a tube 44, on which a board 45 with the ball bearing 42 is mounted. The tube 44 is secured against one of the faces of the lower crosspiece 37. The half-shaft 39 is coupled to the half-shaft 38 with inner teeth 46 engaging in exterior teeth 47 cut at the end of the half shaft 38. The half-shaft 39 is supported on the lower crosspiece 37 by means of a bearing 48 made of a socket 49 on the side of which a ball-bearing 50 is mounted. This arrangement allows an adequate alignment of the bearings and obviates the need for a rigid shaft made in one piece supported by four bearings.

At its cone-shaped end 62, the half-shaft 38 is provided with the braking device 36. This comprises a hub 63 on which a brake-disc 64 is secured. Two jaws 65 and 66 are arranged to act on the brake-disc 64. These jaws are fastened with screws 68 against a crosspiece 67, and this crosspiece 67 is connected with the lower cross-piece 37 by means of braces 69 and 70 which have associated tightening screws 71.

The worm gear 13 is mounted on the shaft 14 supported by bearings 15, 16, 17 and 18 which are mounted on bosses 52 formed on the lower cr sspiece 37. The movable bearing 19 is urged downwardly by pulling means 32, 33, 34 and 35 each of which comprises a cup 53 fastened by screws 54 on the lower crosspiece 37 and a compression spring 55. The compression spring 55 at one end abuts the inner face of the cup 53 and at its other end abuts against a stop 56 on a bar 57. The bar 57 is provided at its upper extremity with a bond 58 having a swivel 59 fastened onto the movable bearing 19. The bar 57 is not guided into the bearing 60 of the cup 53 and this allows the eventual inclination of its axial 61.

Figure 4 shows the driving system for the movable bearing 19. At its lower part, the movable bearing 19 is provided with four semi-cylindrical swivels 72, only two of which are shown in Figure 4. These semi-cylindrical swivels 72 are secured to the movable bearing 19 by screws 73. Each semi-cylindrical swivel works as the upper support for the toggle-joints 28, 29, 30 and 31. The lower support for each toggle-joint 28, 29, 30 and 31 is a cylindrical swivel 74 fastened with a screw 75 into each arm 76 of the toggle-joints 28, 29, 30 and 31. Each toggle-joint 28, 29, 30 and 31 also has an arm 77 one end of which engages the semi-cylindrical swivel 72. The arms 76 and 77 are linked to each other by an axle 78 bearing the cam-rollers 24, 25, 26, 27. The axle 78 is secured to the arm 77 by a screw 79. In order to ensure a contact pressure compensating the cam-roller 24, 25, 26, 27 on the surface of the cams 20, 21, 22 and 23, a compression spring is mounted outside of each toggle-joint 28, 29, 30 and 31. The compression spring 80 is attached at one end to the lower crosspiece 37 and its other end to the arm 76 of each toggle-joint. The compression spring 80 is fastened to the lower crosspiece 37 by a fork 81 provided with an axle 82 which extends through a support piece 83 of the compression spring 80. A stirrup mounted on the arm 76 is connected to the other support-piece 86 of the compression spring by means of an axle 85 which extends through the support piece 86. Each cylindrical swivel 74 of the toggle-joints 28 and 31 (see Figure 2) is centered in a half-bearing 87 which rests on a cone-shaped stop 88 mounted in the lower crosspiece 37. The cone-shaped stop 88 is used to set the vertical position of the axles of the cylindrical swivels 74. This setting occurs with the shifting of each cone-shaped stop and its locking in the cone-shaped stop and its locking system (not shown). The half-bearing 87 is guided by a slide 89 secured to the lower crosspiece 37 by screws 90. The toggle-joints 29 and 30 rest on the cylindrical swivels 74, each of which is centered on a half-bearing 91 mounted on a security system 165. The half-bearing 91 rests on a cone-shaped stop 93 the adjusting of which occurs similarly to the one of the cone-shaped stop 88 of the toggle-joints 28 and 31.

The security system 165 comprises a piston-rod 92 provided with a piston head 94 and located in the chamber 95 of a yoke 96. The piston head 94 is urged against the face 103 of the chamber 95 under the influence of a holding pressure generated by oil supplied via a conduit 97. The face of the chamber 95 has a circular chamber 104 communicating with the atmosphere (the air contained in the oil tank)

through the tube 100. The chamber 95 is also connect d to a draining device 105 (see Figure 7) by means of a tube 102. The piston rod 92 comprises a piston 106 which can slide into a cylinder 107 arranged in the yoke 96. The piston 106 closes the compression chamber 108 receiving the oil under pressure from the conduit 101. The pressure in the chamber 95 is maintained by a pilot distributor 109 leading into the chamber 95. The pilot pressure acts on a piston 110 through the tube 99. The oil of the pilot valve is evacuated through the tube 98 towards the main tank 112 (see Figure 7).

The movable bearing 19 is guided by two shoes 121 mounted inside two lateral frames (not shown). These two shoes 121 are arranged so that they can pivot around an axle 122. On its lateral faces, the movable plate 19 is provided with a slide 123 in which the shoe 121 engages.

Figure 5 shows the toggle-joint 28 in its extended position, i.e. when the movable platen 19 is at its upper dead-point. The lower dead-point of the movable platen 19 is represented by the dotted lines 113. The bearing 15, similar to the bearings 16, 17 and 18 (see Figure 2) is constituted by a lower clamp 114, secured on the boss 52 by means of screws 115, and by an upper clamp 116 secured against the lower clamp 114 by screws 117. The lower clamp 114 and the upper clamp 116 hold the bushing making a bearing.

In normal operation of the cutting station, rotation of the drive shaft 9 is transmitted to the shaft 14 through worm 13. The cams 20 to 23 rotate with the shaft 14 and through their contact with the cams 24 to 27 cause the toggle links to continuously move between their retracted (Figure 4) and extended positions (Figure 5). Thus the movable platen undergoes a reciprocatory up and down motion as sheets are fed through the cutting station.

Figure 6 shows the movable platen 19 in its released position, i.e. when the axis of the cylindrical swivels 74 of the toggle-joints 29 and 30 (see Figure 2) has been shifted horizontally by the piston 106 from a position 119 to a position 120. This shifting causes the movable platen 19 to pivot so that a normal to its surface is an angle α with respect to the vertical. The movable bearing pivots around the axle 122 of the shoe 121. This pivoting of the movable bearing 19 is arranged to prevent a gripper-bar 124 having grippers 5 and located between the upper platen 125 and the movable bearing 19, from being squashed in case of a sudden stop of the platen press due to the declutching of the security coupling 140. In these machines, the gripper-bar is stopped quite frequently, e.g. when a jamming occurs. The stopping of the movable bearing 19 is slower than the stopping of the gripper-bar. Thus if the movable bearing 19 stays parallel t the upper platen 125, the cutting tool 126 can percuss th gripp r bar 124. This must be avoided, because the gripper bar 124 can be badly damaged, which can lead to serious inconv niences and delays. Th grippers 5 on the gripper bar 124 comprise two jars 166, 167 (see also Figure 1) secured in a plane corresponding to the plane defined by the lower face 168 of the gripper bars 124. In the present device the toggl joints 29 and 30 are released by the hydraulically operated arrangement 165 so that the platen 19 moves to its inclined position shown in Figure 6. In this position the gripper bar 124 cannot be squashed between the platens 19 and 125.

Figure 7 is a schematic view of the hydraulic control for the security device. It shows three blocks A, B, C. Block A represents a unit for producing the hydraulic pressure and comprises a double acting pump 127 driven by a motor 128, a distributor 129, two pressure reducers 130 and 131, two oleo-pneumatic accumulators 132 and 133, two pressostats 134 and 135 and retaining valves 136, 137, 138 and 139. The double effect pump 127 is arranged to provide two different pressures, one of 150 bars and one of 50 bars. The 150 bars pressure is distributed to block B and to block C, in order to be available for an emergency stop of the platen press. The emergency stop of the platen press can result from the detecting of an overload in the driving mechanism of the gripper bar 124. Any overload causes the disengagement of the security coupling 140 associated with chain wheel 7 and the actuation of a piloting distributor 141. The 50 bars pressure is to be distributed to block C and only actuates the braking device 36 when the platen press is stopped normally. Then 150 bars pressure is lead to the blocks B and C through the pipes 142, 143, 144, 145 and 146. From the pump, the oil is delivered to the distributor 129 under the control of the pressostat 134 mounted on the pipe 142, then led to a pressure reducer 130 which sets the pressure at 110 bars. A valve 138 is mounted on the pipe 146 which leads to the tubes 142 and 145, as well as to the oleo-pneumatic accumulator 132. A non-return valve 137 is mounted in the pipe 145. The pipe 142 supplies the block C and the pipe 144 of block B, after their connection with the piloting valve 141. The 50 bars pressure is to the block C via the pipes 147 and 148, after being reduced to 40 bars by the pressure reducer 131. The pressostate 135 mounted on the pipe 148 controls the motor 128, so that the pressure in the pipe 148 is maintained between 15 and 20 bars. The pipe 147 is provided with a non-return valve 139 near its junction with the pipe 148 and the oleo-pneumatic accumulator 133. The block B represents the control for the disengagement device of the toggle-joints 149 (see Figure 2).

This disengagement occurs in case of an emergency stop of the platen press, for instance because of jamming. It is initiated by the release of the security coupling 140 in response to an overload condition. The oil pressure provid d by block A through the pipes 99 with two piloting valves 109 (see Figure 4), which are thus k pt closed. Each piloting valve 109 controls a disengagement device of the toggl -joints 149. The

operating pressur is fed to each disengagement device of the toggle-joints 149 through the tubes 27 supplied by the pipe 143. Each chamber 95 of the disengagement device of the toggle-joints is connected with a draining device 105, comprising a distributor 150 and a strangler 151, through tubes 102. Each disengagement device of the toggle-joints 149 is connected with the atmosphere by means of a distributor 153 supplied by the tube 100. In order to drain the oil of the circular chamber 104 (see Figure 4), compressed air is blasted into the canalisation 152 with the non-return valves 154 and 155. The pressure provided by block A through the pipe 145 is introduced into the pressure chamber 108 through the tube 101 connected to the oleo-pneumatic accumulators 156 and 157. To ensure the simultaneous stopping of the platen press if the toggle-joints are released, the pressure existing in the pipes 142 and 145 is led to block C. The pipe 142 supplies the piloting valve 158 and enters into the chamber 159, whereas the pipe 145 enters into the chamber 160 of the piloting valve 158. The braking system 36 is supplied with oil in order to operate in case of jamming (declutching of the security coupling 140) by a pipe 161 going through the valve 162 and by the pipe 148 in case of normal braking. The pipe 148 goes through both valves 163 and 164. The release device of the toggle-joints 149 and braking system 36 operate simultaneously in case of a stopping of the platen press due to jam. Then, under the action of the piloting valve 141, the oil of the pipe 142 is fed back to the tank 112 and the pressure drops in the tube 99. The piloting valve opens and the oil under pressure in the chambers 95 of the release of the toggle-joints 149 can flow back to the tank 112 through the tube 98. As soon as the piloting valves 109 are open, the counter-pressure in the tube 101 acts on the piston 106, which provokes the clearance of the piston head 94 and lets the oil of chamber 95 flow as well through the conduit 100 entering into the chamber 104. The result of this is an important acceleration of the shifting of the piston 106. Simultaneously, the piloting valve 158 is opened and the oil under pressure in pipe 145 acts on the braking system 36, because the valve 162 is open at this precise moment and the two valves 163 and 164 are closed in case of normal braking of the machine, i.e. with a "stop" pusher (not shown), the valve 163 and 164 are open and let the oil under pressure coming through the pipe 148 flow to the control elements of the braking jaws of the braking system 36. After the stop provoked by the declutching of the security coupling 140 of the platen press and the restoration of the normal operating conditions of the platen press, the machine can be set working again. Then, the piloting valv 141 lets the oil flow into the pipe 148 and the chambers are again under pressur , as well as the chamber 159 of the piloting valve 158. The pressure is als restored in the tubes 101 and the compressed air is pulsed into chamber 104 to drain off the remaining oil. The chamber 95 is drained with the draining appliance 105, th valve 163 is set again towards the tank 112, to allow the loosening of the braking system, then closed to refrain the oil under pressure in pipe 148 from operating the braking system.

Claims

1. A cutting station of a platen press comprising a lower movable platen, an upper fixed platen, the lower platen being mounted on an arrangement of cam operable toggle links, driving means for rotating the cams to cause the toggle links to move successively between an extended and a retracted position thereby producing a reciprocatory raising and lowering of the lower platen, release means associated with at least some of the toggle links for releasing operation thereof, and braking means associated with said driving means, said release means and said braking means being operable substantially simultaneously in response to the detection of an overload condition in the platen press.

2. A cutting station as claimed in claim 1 comprising four toggle links which have associated cam rollers each engaging a respective cam, said toggle links being arranged in pairs perpendicularly to the direction of movement of sheets in the press, and wherein said release means is associated with one of said pairs.

3. A cutting station as claimed in claim 1 or claim 2 wherein said release means is hydraulically operable.

4. A platen press comprising a lower movable platen and an upper fixed platen, means for actuating said lower movable platen and means for transporting the sheets through the cutting station of the platen press, the means for controlling the lower movable platen including cam-operable toggle-joints, the toggle-joints being arranged in pairs and each pair of toggle-joints being located on an axis extending generally perpendicular to the direction of movement of the sheets in the platen press, driving means including rotatable cams for operating the toggle-joints to cause a reciprocatory raising and lowering of the lower platen, an hydraulically operable toggle release device for releasing one pair of toggle-joints, said driving means having an associated braking device and said release device and the braking device having a hydraulic control circuit for causing simultaneous operation thereof.

5. A platen press according to claim 4 including pulling means which acts on the lower platen to urge it downwardly.

6. A platen press according to claim 4 wherein the braking device includes two jaws arranged to act on a brake-disc carried on a drive shaft.

7. A platen press according to claim 4 wherein said hydraulic control circuit includes a control valve which is actuated by the release of a coupling located on the m ans f r transporting the sheets in the platen press.

8. A platen pr ss according to claim 4 wherein

th braking device is actuated independently from th toggle-joint release means when the plate press is stopped in normal operation.

9. A platen press according to any one of claims 4 to 8 wherein said release device comprises a piston operating within a chamber defined by a yoke which forms part of the bearing for a toggle joint.

10. A platen press according to claim 9 wherein the piston head is arranged to obturate a chamber connected with a tube leading to the atmosphere through a distributor.

11. A platen press according to claim 10 wherein the oil of the chamber is drained out with compressed air blasted into the tube.

12. A platen press according to claim 9 wherein the chamber of the yoke is released under the action of a pilot valve.

13. A platen press according to any one of claims 4 to 12 wherein said transporting means comprises grippers mounted on chain driven gripper bars.

14. A platen press substantially as hereinbefore described with reference to and as shown in the accompanying drawings.

Printed for Her Majesty's Stationery Office by the Courier Press, Leamington Spa, 1983. Published by the Patent Office, 25 Southampton Buildings, London, WC2A 1AY, from which copies may be obtained.

DOCKET NO: A-3916

SERIAL NO: _____

APPLICANT: G. Klassen et al.

LERNER AND GREENBERG P.A.
P.O. BOX 2480
HOLLYWOOD, FLORIDA 33022
TEL. (954) 925-1100